



BELIZE

**ANNUAL
REPORT**

of the

DEPARTMENT OF AGRICULTURE

for the year

1974

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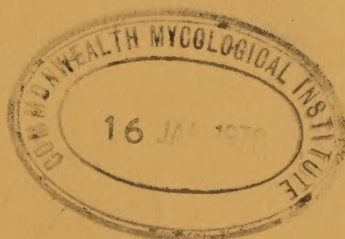


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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE

FOR THE YEAR 1974

Part I: GENERAL REVIEW OF AGRICULTURE

A. Weather Conditions:

The dominant features of the weather in 1974 were two hurricanes, 'Carmen' and 'Fifi', which hit the country of Belize on 1st September and 19th September respectively. Hurricane 'Carmen' hit the Northern districts with strong winds and torrential rainfall, causing severe damage to the corn crop and flatter sugar cane fields and fruit trees. Hurricane 'Fifi' hit the Southern districts destroying 90% of the banana crop at Cowpen as well as causing significant damage to the corn crop in the Cayo and Stann Creek districts. Flooding of creeks and rivers compounded the damage to the corn crop caused by strong winds and it is estimated that over 50% of the 1974 corn crop was lost as a result of the two hurricanes. The overall loss to the agricultural industry has been placed at well over \$6 million Belize currency.

In general, the rainfall pattern was very variable in 1974. Light, scattered showers were experienced in all areas of the country during the months of January and February. The month of March was mainly hot and dry, although heavy showers in the Stann Creek district resulted in an over-average monthly rainfall of 10.18 inches at the Stann Creek Agricultural Station. April and May were generally hot and dry with only a few light, scattered showers occurring in some areas. The traditional rainy season descended on the Southern half of the country in mid-June. Rainfall recorded at the Toledo Agricultural Station for the month of June was 12.69 inches. Nevertheless, the Northern and Western districts remained relatively dry throughout June and July. This contributed to a lengthening of the sugar cane season in the North. The prolonged dry season in these areas, however, resulted in poor germination of early planted corn and stunted growth of young corn plants and pasture grasses. Heavy showers which fell sporadically in the Southern districts caused flash flooding of rivers and creeks with only minor damage to crops along river banks.

A short dry season occurred during the month of August. September was hot and wet throughout and is memorable for the two hurricanes which struck the country during the month. The rainfall pattern was abnormal in October. Highest rainfall for October was experienced at Corozal where 18.62 inches of rain fell. On the other hand, the Toledo district - traditionally the wettest - experienced only 5.35 inches of rain. Heavy showers which fell in November adversely affected the harvesting of rice as well as the preparation of land for the planting of the off-season corn crop and the 1974/75 Red Kidney beans crop. Again, rainfall was heavier in the Northern half of the country. Rainfall for the month of December was normal in all districts with the exception of Orange Walk where heavy showers delayed the harvesting of sugar cane on account of the wet condition of fields.

Monthly rainfall figures recorded at various stations are contained in Appendix Table I of this report.

January, February, November and December were the coolest months of the year. Day temperatures were highest during the dry season, which lasted from March until July. Mean monthly maximum and minimum temperatures recorded at various stations are given in Appendix Tables II and III respectively. Average monthly humidity figures are contained in Appendix Table IV.

B. Export Crops:

Sugar Cane:

The 1974 sugar crop commenced in the Corozal district on 10th December, 1973 and in the Orange Walk district on 2nd January, 1974. The late start in the Orange Walk district was the result of extremely wet weather which delayed the harvesting of sugar cane. Nevertheless, sugar production for 1974 was a record 88,897 long tons - or 18,727 long tons over the 1973 level of production. The Tower Hill factory ceased its grinding operations on 17th June after having produced 43,941 long tons of sugar from 416,219 tons of cane. The Libertad factory continued its operations up to August 4, producing 44,956 long tons of sugar from 407,855 tons of cane. The average tons cane per ton sugar ratio was 9.27 - the lowest achieved since 1964 when the ratio was 8.11. Good quality cane, favourable weather conditions, negligible froghopper damage, and the introduction of new cane varieties, all contributed to the record crop. Comparative production statistics for 1973 and 1974 are given below:

Table I. Comparative Sugar Production Statistics, 1974 and 1973

	<u>1974</u>	<u>1973</u>
<u>Tower Hill Factory</u>		
Tons cane Ground	416,219	335,175
Tons Sugar Produced	43,941	31,390
Tons Molasses Produced	14,358	12,963
TC/TS Ratio	9.47	10.68
<u>Libertad Factory</u>		
Tons Cane Ground	407,855	383,055
Tons Sugar Produced	44,956	38,780
Tons Molasses Produced	12,684	13,167
TC/TS Ratio	9.07	9.88
<u>Total</u>		
Tons Cane Ground	824,074	718,230
Tons Sugar Produced	88,897	70,170
Tons Molasses Produced	27,042	26,130
TC/TS Ratio	9.27	10.24

In 1974, the United States Department of Agriculture announced increases amounting to 7,060 long tons on Belize's export quota to the U.S.A. This brought the 1974 U.S. quota to just under 49,000 long tons. Further good news to the sugar industry consisted of an increase in the price of sugar shipped to the United Kingdom in 1974 under the Negotiated Price Quota (N.P.Q.) of the Commonwealth Sugar Agreement. The increase of £22 sterling or \$88.00 Belize currency per long ton was aimed at compensating developing Commonwealth countries for the increasing production costs experienced in their sugar industries.

Exports of sugar in 1974 consisted of 83,725 long tons valued at over \$56.5 million Belize currency. Total exports was comprised of 54,825 long tons to the U.S.A. and 28,900 long tons to the United Kingdom. Molasses exports to the U.S.A. amounted to 24,828 long tons valued at \$1.2 million Belize currency.

The final prices paid for cane delivered in 1974 were \$47.03 per ton to Corozal farmers and \$45.08 per ton to Orange Walk farmers. The total amount paid to cane farmers was in excess of \$38 million.

The Belize Sugar Board issued provisional cane licences for an additional 6,500 tons of cane to 433 small farmers of the Orange Walk division of the Cane Farmers' Association. Also, a loan of \$400,000 was approved to the Orange Walk division by the Development Finance Corporation to enable small farmers to establish an additional 4,000 acres of sugar cane to meet existing shortfalls in their licensed quotas.

An eminent economist from the University of the West Indies was commissioned to study and report on the economics of sugar cane transportation in Belize. He spent three weeks in the sugar producing areas and held discussions with representatives from all segments of the industry. Meanwhile, a loan of over one million Belize dollars was approved to the Belize Government from the Caribbean Development Bank for the purpose of improving sugar roads.

Finally, the 13th Annual Conference of the Caribbean Cane Farmers' Association was held in Belize from August 19 to 21st under the auspices of the Belize Cane Farmers' Association.

Citrus:

A record production was achieved during the 1973/74 citrus crop which was harvested during the period August, 1973 to June, 1974. Orange production reached the all-time high of 1,000,996 contract boxes (90 lb. net each), or 3% higher than the 1971/72 level of production. Grapefruit production increased by 9.4% to 427,321 boxes of 80 lb. net each. Salada Belize Limited processed 49% of the crop, while the Citrus Company of Belize Limited (C.C.B.) processed 51%.

The Citrus Company of Belize Limited bought grapefruit from growers to be exported as fresh fruit at \$1.80 per contract box. Both Companies bought grapefruit for processing into juices, concentrates and segments at the price of \$1.80 per contract box. Contrary to the practice in previous years, both early and late oranges were bought at the same price of \$1.70 per contract box. The total amount paid out for fruit delivered to the factories was \$2,643,516 of which individual growers received \$1,096,706 and the Companies' groves \$1,546,810.

The Citrus Growers' Association had a total membership of 294 growers in 1974. Of these members, 238 members delivered grapefruit and 251 members delivered oranges to the factories during the crop year. A cess of 6 cents per contract box of fruit delivered was levied by the Association in order to obtain funds to cover its operational costs. The acreage under citrus remained at around 9,500 acres of which oranges accounted for 7,000 acres and grapefruit 2,500 acres.

In addition to one shipment of fresh grapefruit to the United Kingdom, fresh oranges were exported to Mexico. Exports of juices, concentrates, segments as well as small quantities of citrus oil were also made in 1974. The total value of all citrus exports for the calendar year 1974 was approximately \$6.3 million. Details of citrus exports are provided in Table 2 below:

Table 2. Exports of Citrus Products, 1974

<u>Product</u>	<u>Quantity (lb)</u>	<u>Approximate Value (\$ Belize)</u>
Fresh grapefruit	2,426,800	436,017
Orange Juice	3,406,900	429,906
Grapefruit Juice	1,570,200	181,582
Orange Concentrate	9,417,400	2,984,391
Grapefruit "	851,700	276,543
Grapefruit Segments	5,433,900	1,511,473

Orange Oil	1,502,905	494,311
Grapefruit Oil	7,618	10,415
TOTAL	24,617,423	6,324,638

Honey:

Total production of honey in 1974 was 363,585 lb. compared to 292,458 lb. in 1973. This represented an increase of 24.3 per cent over the 1973 level of production. Extraction of honey commenced in the Orange Walk district in January, but excessive rainfall during the first two weeks of January prevented some beekeepers from extracting honey. Extraction in the Corozal district got off to a slow start in February. The peak production months were April and May during which the dry weather was excellent for extraction. The honey flow declined from the month of June onwards. There was a scarcity of flowering plants in the months of October to December, as a result of the damages to trees caused by hurricane 'Carmen' in September.

During 1974, the number of hives increased by 471, the number of apiaries by 41, and the number of beekeepers by 24. Honey production is still concentrated in the two Northern districts of Corozal and Orange Walk as can be seen in Table 3 below which gives the distribution of apiaries, hives, beekeepers, and production as at 31st December, 1974:

Table 3. Distribution of Honey Production by Districts, 1974

<u>Districts</u>	<u>No. of Apiaries</u>	<u>No. of Hives</u>	<u>No. of Beekeepers</u>	<u>Honey Production 1974 (Lb.)</u>
Corozal	57	1,396	31	108,359
Orange Walk	104	2,007	72	232,348
Belize	17	232	10	2,636
Cayo	26	446	14	12,642
Toledo	18	138	12	7,600
TOTAL	222	4,219	139	363,585

There were no major outbreaks of pests or diseases during the year. One case of American Foul Brood was diagnosed in Toledo and one at Central Farm in the Cayo district. The affected hives were burnt and all hives in the two apiaries treated with Sulphathiazole and Terramycin powder. Seven hives were destroyed by 'Marching Army' ants in the Orange Walk district. Beekeepers were fortunate in that infestation of cane fields by Froghoppers was minimal and as a result the aerial spraying of sugar cane fields, which often leads to insecticidal poisoning of bees, was not carried out frequently.

The export price of honey fluctuated widely in 1974 - from £360 Sterling per long ton F.O.B. in February to £390 in March, to £312 from September to December. Exports of honey in 1974 amounted to 146 long tons valued at around \$230,000 Belize currency.

Bananas:-

Work on the rehabilitation of the banana industry continued in 1974 and by the end of the year 1,050 acres had been established to the variety 'Grand Nain'. The acreage under bananas is expected to increase to around 4,000 acres. Bananas will be shipped to the United Kingdom in boxes of 40 lb. net each and the first shipment will be made in February or March, 1975.

Mangoes:

One large commercial concern, Tropical Produce Co. Ltd. is cultivating 1,200 acres of mangoes for eventual export. By 1974, 900 acres had reached the bearing stage and trial shipments were made to the United States of America by road via Mexico. The main varieties grown are Tommy Atkins, Hayden and Zill. Other varieties planted include Van Dyke and Keitt. Around 750 tons of mangoes were produced in 1974, a large proportion of which was sold on the domestic market.

C. Food Crops:

Rice:

The total area cultivated to rice in 1974 was 10,275 acres from which an estimated 16.6 million lb. of rice paddy was harvested. Big Falls Ranch Ltd. accounted for two-thirds of the total production from the 4,600 acres of irrigated rice which the Company double-cropped in 1974. Apart from Big Falls Ranch, the only mechanised rice operations were in the Toledo district where a total of 773 acres of mechanised rice was cultivated in 1974. The rice co-operative at Rancho Dolores was not involved in production during 1974. Twelve farmers of the South Stann Creek area cultivated 100 acres of rice in 1974. Table 4 below gives the distribution of total acreage by district:-

Table 4. Rice - Distribution of Acreage by District, 1974

<u>District</u>	<u>Acres Mechanized</u>	<u>Acres 'Milpa'</u>	<u>Total Acres</u>
Corozal	---	186	186
Orange Walk	---	767	767
Belize	4,600	249	4,849
Cayo	---	321	321
Stann Creek	---	152	152
Toledo	773	3,227	4,000
TOTAL	5,373	4,902	10,275

There were no major disease or insect problems during the year. A field at Trapiche in the Cayo district was affected by sucking bugs and spraying with Sevin was carried out with good results. Stem borers also caused moderate damage to some rice fields in the Belize district. Bird damage to germinating seedlings and maturing grains were again severe in the Belize and Cayo districts. Yields were also reduced by the two hurricanes which struck the country in September. Average yields in the Belize and Cayo districts were low at 750 lb./acre and 600 lb./acre respectively. Yields in the Toledo district ranged from 1,500 lb./acre to 2,000 lb./acre.

The Marketing Board purchased 4,391,639 lb. of rice paddy for milling from the 1974 crop. Big Falls Ranch Limited milled most of their own rice, although some was sold to the Marketing Board in the form of paddy rice. Big Falls Ranch supplied the domestic market with around 3 million lb. of packaged rice, as well as exporting 1,200 short tons of rice at an approximate value of \$242,600 Belize currency.

Corn:

The acreage planted to corn increased in all districts in 1974. Total acreage cultivated was 29,088 acres and production of dried grain was estimated at 29 million lb. Once again, the bulk of the mechanised cultivation was accounted for by the Mennonite communities in the Orange Walk and Cayo districts.

The cultivation of corn was done mainly under the 'Milpa' system in the Belize, Stann Creek and Toledo districts. The main improved varieties used are VS-550A (synthetic), Pioneer X-306 and Poly T-66 (hybrids). Many 'milperos' used local types of seed saved from the previous crop.

The breakdown of total acreage by district is given in Table 5 below:-

Table 5 - Corn - Acreage Cultivated by District. 1974

<u>District</u>	<u>Acreage Cultivated</u>
Corozal	3,101
Orange Walk	13,040
Belize	709
Cayo	7,546
Stann Creek	449
Toledo	5,933
TOTAL	29,088

Hurricane 'Carmen' did considerable damage to the corn crop in the Corozal district, while hurricane 'Fifi' severely affected the crop in the Stann Creek and Cayo districts. Flash floods accompanying 'Fifi' washed away some 1,062 acres of corn planted along river banks in the Cayo district. Yields of 'milpa' corn in the Cayo district was averaged at 500 lb./acre, while mechanised corn fields yielded an average 1,500 lb./acre.

In the Belize and Cayo districts a large number of farmers had to replant their corn fields following the extended drought. More farmers used VS-550A corn seed than in the previous year. Some 20 acres of late-planted corn were severely damaged by Army Worm in the Spanish Lookout area of the Cayo district.

Red Kidney Beans:

The acreage planted to Red Kidney beans in 1973/74 was 5,075 acres from which an estimated 2.75 million lb. of dried beans were harvested. Yields were very variable, ranging from 360 lb. per acre in the Belize district to 1,000 lb. per acre at Spanish Lookout in the Cayo district. Once again, most of the production was carried out on a mechanised basis - the crop being planted after corn in a rotation. Ten acres of the crop in the Cayo district were affected by a Rust disease. Early plantings in the Toledo district suffered from a fungal disease indentified as "Web Blight". Five acres were completely lost and 2 acres severely damaged by this disease.

Black Beans:

The acreage planted to black beans in 1974 was 145 acres of which 105 acres were planted in the Corozal district and the remainder in the Orange Walk and Cayo districts. Average yield from the crop was around 500 lb./acre.

Peanuts:

One hundred and seventy-two acres were cultivated to peanuts in 1974. The crop is cultivated mainly by the Mennonites who sell it on the domestic market in the shell at 40¢ per quart.

Root Crops:

Root crops such as cassava, sweet potatoes, coco-yams and yams were grown for local consumption mainly on small plots of an acre or less in size or intercropped with corn. Total acreage cultivated to these crops in 1974 was 720 acres made up as follows:

Cassava	420 acres
Coco	150 acres
Sweet Potatoes	120 acres
Yams and Yampie	30 acres
TOTAL	720 acres

Cassava was produced mainly in the Stann Creek, Toledo, and Cayo districts. Sweet potatoes and cocoyams were produced in all districts. All root crops were cultivated by traditional methods involving shifting cultivation.

Plantains and Bananas:

Plantains and bananas were cultivated for sale on the domestic market in all districts during 1974. The total area planted to these crops in 1974 was 944 acres of which plantains accounted for 758 acres and bananas 186 acres. Hurricanes 'Carmen' and 'Fifi' devastated plantain and banana fields in the Northern and Southern districts. As a result, there was a scarcity of these commodities in municipal markets toward the end of the year.

Vegetables:

The supply of fresh vegetables for local consumption continued to be inadequate to meet the demand in 1974, and imports were made from the neighbouring Republics of Guatemala and Mexico. It is estimated that 140 acres of vegetables were cultivated in 1974. The main vegetables produced locally were cabbages, tomatoes, peppers, pumpkins and squash. Cucumbers, lettuce, and carrots were also produced in limited quantities.

There are only a few medium size vegetable growers who produce from 5 to 10 acres of vegetables. The remainder of the production is carried out on plots of from one-eighth to one-quarter of an acre in size. The acreages cultivated to the various vegetable crops in 1974 were as follows:

Table 6. Acreage Cultivated to Vegetables. 1974

Cabbage	27 acres
Tomatoes	32 acres
Hot Peppers	26 acres
Pumpkins & Squash	28 acres
Cucumbers	12 acres
Sweet Peppers	5 acres
Other Vegetables	10 acres

TOTAL	140 acres
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Figures on imports of vegetables into Belize for the year 1974 are given in Table 7 below:

Table 7. Imports of Vegetables into Belize, 1974

<u>Type</u>	<u>Quantity (lb.)</u>	<u>Approximate Value (\$)</u>
Irish Potatoes	1,822,300	403,220
Onions	1,072,600	240,525
Tomatoes	1,990,100	69,739
Cabbage	378,300	75,931
Other fresh vegetables	240,800	60,152
Garlic	31,700	26,568
Leguminous vegetables	215,000	113,204
Processed vegetable Products	370,400	198,183
TOTAL, 1974		1,187,522
1973 (6,368,600)		(964,445)

The above figures show that although the total volume of vegetable imports decreased slightly in 1974, the value increased by over 23% due to the higher cost of imports.

D. Other Crops:

Water melons:

Fifty-nine acres of watermelons were cultivated in 1974 with an estimated yield of 450,000 lb. of melons. Forty acres were cultivated in the Cayo district, of which 14 acres were lost as a result of disease problems.

Grain Sorghum:

The area planted to grain sorghum in 1974 was 1,080 acres. The Mennonites at Spanish Lookout in the Cayo district planted 490 acres while other farmers in that district planted 236 acres. Of the remaining acreage, 249 acres were planted in the Belize district and 105 acres in the Orange Walk district. Average yield for this crop was around 2,000 lb. per acre. Grain sorghum is becoming increasingly popular on account of its tolerance to drought.

Tobacco:

A total of 100 acres of tobacco was cultivated in 1974. Caribbean Tobacco Company at San Miguel in the Cayo district cultivated 75 acres, while 9 small farmers accounted for the additional acreage. Yields were around 10,000 lb. of green leaves per acre on the average, although yields of up to 12,000 lb. per acre were obtained from some fields.

Fruit Trees:

Fruits such as mangoes, cashew, breadfruit, and avocado pears were grown for the domestic market on small holdings. The lack of organised production and marketing, however, militates against the collection of accurate data on total production and amounts marketed.

The two hurricanes which hit the country in September damaged mango, avocado, and coconut trees - especially in the North of the country. Nurseries on the government agricultural stations were expanded to meet the

increasing demand for grafted and budded fruit trees.

E. Pests and Diseases of Crops:

There were no major disease or pest problems in 1974. Army worm (*Spodoptera frugiperda*) damage to the corn and rice crops was not as severe as in previous years. The Cabbage Looper (*Plusia brassicae*) was the most important pest of vegetable crops. Froghopper damage to sugar cane fields was minimal. Thrips and aphids were minor pests of citrus and mango during the year. The Red Kidney beans crop was affected to varying degrees by Powdery mildew, Bean Rust (*Uromyces phaseoli*), Mosaic virus and Web Blight.

Crown Rot and Blossom End-rot were diseases affecting tomato plants. The rice crop was also subject to Brown Leaf Spot (*Helminthosporium oryzae*) and Rice Blast. The citrus crop was again affected by the Mexican Fruitfly (*Anastrepha ludens*), Premature Fruit-drop and to a lesser extent Gummosis.

Root crops were affected by nematodes. Ground moles caused damage to plantain, bananas, and root crops in some areas. Wild birds were, once again, serious pests of the rice crop in the Belize and Cayo districts.

F. Livestock Industry:

Cattle:

The national cattle herd was estimated at around 45,000 head in 1974. Growth of the national herd has decelerated over the past two years due to uncertainty over export market together with depressed prices. The emphasis continued to be mainly on beef production and there were no significant developments in the budding dairy industry. Exports of beef to the United States of America amounted to 159,700 lb. valued at \$157,160. Exports to the United States of America were discontinued from March onwards when there were drastic decreases in the price of beef in the U.S. market. A breakdown of the number of cattle slaughtered and production of dressed beef in 1974 is contained in Appendix Table V of this report.

Western Dairies Limited of Spanish Lookout continued to supply pasteurised milk to consumers in Belize City and Belmopan during 1974. Local production of dairy products were supplemented by imports of \$ 8.67 million worth of dairy products, details of which are given in Table 8 below. There exists considerable scope for the development of a dairy industry in Belize. Given the country's natural resource endowments, it should be possible to produce a large proportion of the total requirement of dairy products once the necessary capital and expertise are acquired.

Table 8. Imports of Dairy Products, 1974

<u>Product</u>	<u>Volume (lb.)</u>	<u>Value (\$ Belize)</u>
Evaporated and Condensed Milk	6,892,600	3,468,512
Powdered Milk	1,759,700	2,216,543
Milk and Cream (fresh)	87,300	54,845
Butter	736,300	1,165,174
Cheese	1,399,600	1,766,313
TOTAL, 1974	10,875,500	8,671,387
TOTAL 1973	7,707,300	4,936,874

During the first two months of the year, weather conditions were favourable for pasture growth as a result of which cattle were in prime condition. From March onwards, the decline in pasture growth resulted in loss of body weight in most herds. The main problem is the lack of sufficient improved pastures to support animals during the dry season. Cattle rearers in the North resorted to the feeding of cane tops and chopped whole cane in an effort to stem the decline in body weight of their animals. The problem of malnutrition during the dry season was exacerbated by the higher incidence of internal and external parasites which occurs during this time every year. With the onset of the rains in June/July, pastures and cattle gradually regained condition which was maintained throughout the remainder of the year.

Establishment of improved pastures was carried out in the Northern districts as farmers planted Carib and Jaragua grass at the start of the rainy season. One cattle enterprise in the Orange Walk district established 500 acres of Carib grass and 300 acres of forage sorghum in December, 1974. Expansion also occurred in the Belize and Cayo districts. The demand for breeding stock was strong throughout the year, and several hundred breeding cattle were supplied to cattle rearers from the Government livestock stations.

Pigs:

The pig population numbered around 17,000 head in 1974. The country was self-sufficient in fresh pork, and pigs were exported to Mexico during the year. A total of 5,795 pigs were slaughtered in 1974, yielding a total dressed weight of 426,370 lbs. (see Appendix Table V for breakdown by district). The export of pigs was limited to animals of over 225 lb. liveweight as these heavier animals are not in demand on the domestic market. An export tax of \$30 per head was also levied in an effort to increase the domestic supply of pork by cutting back on exports of live animals. Exports of live pigs amounted to 2,072 head valued at \$116,000 Belize currency.

Pig production occurs mainly on a back-yard basis with extremely low levels of management. The unavailability of sufficient numbers of good-quality breeding stock and the increased costs of concentrated feed were the major deterrents to expansion in the industry. Although the country has reached the self-sufficiency level in fresh pork, practically all processed pork products such as hams, bacon, sausages, pig tails and lard are imported. There exists, therefore, considerable scope for expansion of production for import displacement.

Poultry:

The Mennonite communities continued to be the main commercial producers of poultry meat and eggs in 1974. Despite a 30 per cent increase in the price of feed, early in the year the supply of poultry meat and eggs on the domestic market continued to be adequate. Nava's Sani-Chick in the Belize district began supplying the Belize City market with 1,200 broilers per week, but had to reduce this number to 800 a week by March on account of irregularity in the supply of baby chicks from the United States of America. Apart from the Mennonites there were several poultry enterprises in the Cayo district with flocks of from 200 to 1,600 birds.

In May, the price of poultry feed increased by 20% to \$22.60 per 100 lb. The result was a scarcity of eggs on the local market by August as the price of eggs is controlled by law and escalating feed costs rendered layer operations uneconomic. Some poultry rearers began slaughtering their laying flocks.

In September around 100 broilers were drowned on account of flooding of the Sittee River caused by Hurricane 'Fifi'. Two commercial poultry operations in the Belize district went out of business during the year

as a result of the cost-price squeeze.

Production of poultry meat in 1974 is estimated at 2.75 million lb. A further 1.68 million lb. was imported, bringing the total estimated consumption of poultry meat in Belize to just over 4.4 million lb.

Sheep and Goats:

There was little or no change in the population of sheep and goats in 1974. These two classes of livestock continued to play only a minor role in the livestock industry. Mutton is not popular among Belizean consumers - except in the barbecued form. There were around 2,700 sheep and 800 goats in the country in 1974. It is difficult to estimate the production of mutton as most of the animals are slaughtered on-farm.

Animal Health:

There were no major outbreaks of reportable diseases in 1974. No cases of Vesicular Stomatitis were confirmed, although three samples were sent to the AFTOSA Centre in Brazil for laboratory examination. Similarly, there were no confirmed cases of Rabies or Hog Cholera (Swine Fever). The main problem in cattle consisted of three outbreaks of Blackleg which occurred in the Cayo district in March, May and June respectively. Twenty-eight (28) head of cattle were lost as a result of these outbreaks. A total of 4,531 head of cattle were vaccinated against Blackleg in 1974.

Anaplasmosis resulted in the death of eleven head of cattle at Central Farm in November. The incidence of this disease is still low and is usually associated with poor management leading to a buildup of helminths and ticks in pastures.

Screw-worms and other external and internal parasites took their toll on cattle during the dry season. These parasites compound the malnutrition problem which occurs during every dry season. Two cases of foot-rot in cattle were reported from the Toledo district.

The main disease found on post-mortem inspection are Tuberculosis in cattle and pigs and Cysticercosis cellulosae in pigs. The incidence of these diseases is still low, but they are of considerable importance from a public health viewpoint.

The number of cases receiving veterinary attention increased in 1974 as can be seen from Table 9 below which summarises the number of clinical cases, vaccinations and post-mortem inspections for the years 1971-1974.

Table 9. Clinical Cases, Vaccinations, and Post Mortems, 1971-1974

<u>Year</u>	<u>Cattle</u>	<u>Horses</u>	<u>Pigs</u>	<u>Sheep</u>	<u>Dogs</u>	<u>Cats</u>	<u>Poultry</u>	<u>Other</u>
1971	866	3,268	257	58	44	4	Several	Nil
1972	1,591	38	257	110	105	1	Several	Nil
1973	16,018	383	587	225	1,034	30	1,316	Nil
1974	6,314	462	665	229	1,260	50	4,970	40

A detailed list of clinical cases is contained in Appendix Table VI, while diseases found at meat inspection may be seen in Appendix Table VII.

Part II. WORK OF THE DEPARTMENT OF AGRICULTURE

A. Policies:

The basic policies of the Department of Agriculture remained the same, viz:-

- (1) Conducting adaptive research on crops and livestock of economic importance;
- (2) disseminating the results of research efforts to farmers through the extension services;
- (3) encouraging farmers to adopt modern techniques of production so as to increase their output, and to use improved varieties of crops and improved breeds of livestock;
- (4) promoting mechanised farming by the provision of mechanical services to farmers at attractive rates; and
- (5) increased production of crops and livestock products so as to achieve self-sufficiency in the basic foodstuffs and develop export surpluses of those products in which the country has a comparative advantage.

B. Crops Research Experiments:

Rice Fertilizer Trial:

A rice fertilizer trial was established at Mafredi in the Toledo district in May, 1974. The experiment tested the response of the rice variety La Belle to different combinations and rates of nitrogen, phosphorus and potassium. There was a clear-cut response to nitrogen in terms of plant height up to the maximum level of 150 lb. N per acre. There were no differences in yield with varying levels of phosphorus and potassium. The average yield obtained in the trial was 2,393 lb. per acre at 14% moisture content.

Soybean Fertilizer Trial:

A trial was conducted at Central Farm to test the responses of two soybean varieties, Acadian and Improved Pelikan, to eight different levels of phosphorus. The results indicated no differences in yield due to higher levels of phosphorus. The lack of response is probably due to the fact that the phosphorus level in the soil was already adequate to meet the needs of the soybean crop.

Sorghum Fertilizer Trial:

An experiment to test the effects of nitrogen, phosphorus, and potassium fertilizers on the sorghum variety Savannah 2 was established at Central Farm in January, 1974. Three plant characteristics were measured: days to reach 50% heading, maximum plant height and grain yield. In terms of all three characteristics, there was no significant response to any of the fertilizers. The conclusion is that existing soil potassium level (around 150 ppm) is adequate to meet the requirements of a sorghum crop. Any addition of potassium fertilizers merely serves to increase the supply of available potassium.

Corn Fertilizer Experiment:-

A corn fertilizer trial was laid down at Bullet Tree in the Cayo district in November, 1974. Seven levels of nitrogen (0, 25, 50, 100, 150, 200 and 250 lb. per acre) and four levels of P_{205} (0, 50, 100 and 150 lb. per acre) were employed. All the P_{205} was applied at planting while 25 lb. of N was applied at planting and the remainder (if any) was applied 35 days after planting. Characteristics studied in the trial were: days to 50% silking, maximum plant height, yield, per cent N in leaf tissue, and change in the soil P_{205} status previous to fertilizer application and post-harvest.

The results indicated that increasing P_{205} levels decreases slightly the number of days needed to reach 50% silking (from an average of 72 days to 69 days). There were no significant differences in plant height due to different fertilizer levels. An average yield of 4,042 lb. per acre of corn at 14% moisture was attained in the trial. There were no significant differences in yield due to fertilizer treatments. The % N in leaf tissue was higher for all treatments above 25 lb. N per acre. The phosphorus status of the soil as measured before and after the trial was not significantly changed by the application of fertilizers.

C. Animal Production and Animal Breeding:

The Government station at Central Farm was again overstocked with cattle in 1974, and as a result a cattle auction was held in December at which 108 head of cattle were sold for a total of \$21,331 Belize currency. The problem of overstocking was partly attributable to delays in land clearing and the establishment of pastures at the Richmond Hill Station to which some cattle would have been transferred from Central Farm. Some pastures at Central Farm were renovated with improved grasses during the year.

Wet weather conditions during the last quarter of the year negated efforts at tick control with the result that there was an outbreak of Anaplasmosis and Piroplasmosis among the weaner stock. Eleven head of cattle were lost as a result of this outbreak. There were no outbreaks of Blackleg during the year. The control of Blackleg has been achieved by vaccinating all cattle under 2 years of age twice a year.

The Artificial Insemination programme was dormant during 1974, as the only trained A.I. Specialist left the Department towards the end of 1973 and no replacement was provided.

Only 240 acres of land was cleared at the Richmond Hill Livestock Station in 1974. This area was established to Carib grass, bringing the total area established to pastures to 400 acres (460 acres Carib grass, 40 acres Guinea Grass). Five miles of fencing were erected - three miles of conventional fences and two miles of dropper fences, the latter being used for sub-division of pastures. By the end of 1974, there were 83 head of cattle on the Station comprised of 45 cows, 1 mature bull, 12 steers, 13 young bulls and 12 heifers. There was one death - a female calf - during the course of the year.

Pure Bred Brahman Herd:

The Pure Bred Brahman cattle maintained good condition throughout the year and, in general, their performance was similar to that of 1973. Average birth weights and average daily gains were similar to those achieved in 1973, while weaning weights were slightly higher than in 1973 and above the overall average for all herds in 1974 (see Appendix Tables VIII, IX, X, XI, XII, IV, XV). Average conception rate was 82% but this will gradually increase with more severe culling and lengthening of the breeding season. Mortality was high

on account of the incidence of Anaplasmosis and Piroplasmosis previously mentioned. A total of 28 animals were sold from this herd during 1974.

Costa Rican Brahman Herds (3/4 or Better):

This herd maintained fair condition throughout the year. Some 400 head were sold from the herd during the course of the year. Results of the cross-breeding programme indicate that the best overall cross is the Charolais x Brahman. This cross exhibited highest average weaning weights and highest average daily gain (see Appendix Tables XII and XV). The only other significant result was the fact that the Hereford x Brahman cross produced calves with weaning weights equal to the herd average, whereas the average weaning weight of Purebred Hereford calves was considerably lower than the overall herd average.

Conception rates were 85%, 73% and 71% for the Costa Rican herd #1, Costa Rican A.I. Herd, and Costa Rican herd #2 respectively. The higher conception rates achieved in herd #1 is attributable to selection pressure over a longer period of time for such traits as high fertility and good mothering-ability. Mortality in these herds was less than 2%.

Red Poll:

The quality of the Red Poll herd has declined over the years. Conception rates decreased considerably in 1974 (see Appendix Table XIII). The Red Poll x Brahman cross cattle exhibited average weaning weights, but were second-best in average daily gain in 1974 (see Appendix Table XV). The herd needs young replacement stock if its quality is not to deteriorate further.

Hereford:

The Hereford herd, with the exception of one mature bull, was sold in 1974. This breed does not appear to be able to survive under our environmental conditions as a Purebreed. Nevertheless, preliminary results indicate that there may be a place for the Hereford in a cross-breeding programme.

Brown Swiss (Dairy):

During the dry season, milking cows were fed with green forage sorghum as a supplement. Also, toward the end of the year the milking herd were fed a mixture of corn and molasses. The average milk production per cow per day was 16 lb. as compared to 19 lb. in 1973. Production per cow per day ranged from 14 to 27 lb. Total milk produced for the year was 65,271 lb.

By the end of 1974 the herd numbered 46 head. There was an average of 12 milking cows in production at any one time during the year. Three cows were removed from the herd when they reacted positively to the test for Brucellosis. Several young bulls and heifers were sold to farmers for breeding purposes.

Pigs:

The small pig herd could not provide sufficient weaners to meet the demand for breeding stock. The cross-bred animals performed best with an average weaning weight of 36.8 lb. and weaning an average of 6.75 pigs per litter, (see Appendix Table XVI).

D. Pasture Research and Development:

Arable Ley Rotation Trial:

Eight steers were moved into the trial area of 9.84 acres in October, 1973. Average age of the steers at the start of the trial was eleven months. Another eight steers were introduced into the trial in December and two additional blocks of pasture, bringing the total acreage utilised to 14.54 acres. Each of six paddocks were grazed for one week and rested for five weeks.

The animals were fed a supplement consisting of common salt and Squibb mineral salt in the ratio of 5:1. In February, a molasses/urea supplement was fed and this continued through the dry season. The animals were drenched three times during the course of the year. The grass varieties used in the trial were Carib, Pangola and Nunbank Buffel.

The average yarded weight of the animals on 21st December, 1973 was 388 lb. By 25th November, 1974, the average yarded weight had risen to 645 lb. The Average Daily Gain (ADG) over the entire period was 0.76 lb. This low A.D.G. is attributable to the low weight gains achieved during the dry season (February to May) and during the last two months when pastures were extremely wet from excessive rainfall. An A.D.G. of 1.8 lb. was achieved in July, 1974 and 1.6 lb. was maintained through August and September.

Pangola Rotational Trial:

The second phase of this trial commenced on 12th December, 1973 when 24 steers were introduced to two 6-acre blocks of pasture. The animals used included 2 Charolais crosses, 1 Hereford cross, 2 Brown Swiss Crosses and one Jamaica Black cross. The remainder of the animals were the offspring of Costa Rican x Brahman matings.

The average age of the steers at the start of the trial was 14 months. Two rotations were tested - a short rotation of 27 days and a long rotation of 40 days. Average yarded weights at the start of the trial were 375 lb. and 391 lb. for the short and long rotations respectively.

The animals gained weight at a very slow rate in January and February. By March, however, the average daily gain ranged from 0.4 lb. to 1.4 lb. per day in the longer rotation and from 0.3 lb. to 1.8 lb. per day in the shorter rotation. In April, the average daily gain per animal increased to 2.0 lb. for the longer rotation and 1.8 lb. for the short rotation. The animals continued to gain rapidly during the period May to August. During this time, steers in the shorter rotation exhibited more rapid growth than those in the longer rotation. Toward the end of the year, the rate of weight gain decelerated on account of the extremely wet condition of the pasture. The waterlogged pastures restricted growth in two ways - the high water content of pasture grasses lowered the intake of nutrients and a substantial loss of potential grazing through trampling of grass in the muddy fields.

The overall average daily gains per animal in 1974 were 1.33 lb. for the short rotation and 1.22 lb. for the long rotation respectively. This trial continued into 1975.

Grass Species Trial:

This trial continued in 1974 with replications at Central Farm in the Cayo district and at Hattievile in the Belize district. At Hattievile, Pangola, Big Bluestem, Kazangula Setaria, and Carib grass grew well. Other varieties, including Pasto Rico, Jaragua grass, Guinea and Hamil exhibited poor growth and considerable weed invasion was evident on these plots. It is believed that the poor drainage features of the soil inhibits proper root development in these grass varieties. By October, most of the grass plots ceased to produce proliferate growth. At this time, Pangola showed the best coverage and was vigorously invading most other plots - thus exhibiting its persistence and adaptability to the area. All plots were regularly fertilized with urea and an NPK fertilizer after each cut.

At Central Farm, best growth was achieved by Hamil, Carib grass, Pangola, Guinea grass and Molopo Buffel. The Guinea grass and Buffel varieties exhibited rapid regrowth during the dry season, confirming their potential as dry season pasture grasses. During the latter half of the year, the Jaragua grass plots exhibited better growth than earlier in the year, and were among the highest producers in terms of fresh weight yields.

Frequency of Cutting Trial on Jaragua Grass:

Jaragua grass suffers a severe handicap to its productivity on account of its flowering habit. Observations made over a number of years have suggested that management practice may well influence the proportion of leaf produced during the flowering period. A trial was initiated in November, 1973 with the objection of observing and measuring the effects of different cutting frequencies and combinations on the yield performance of Jaragua grass with special attention being paid to the effect on flowering and yield during the dry season. Three different cutting frequencies were used - 4, 6 and 8 weekly intervals. Some plots will also be cut at different frequencies for two periods of the year. Regrowth after the first cuts in December was fairly good. Local legumes such as Desmodium canum, Desmodium scorpiurus, and Desmodium triflorum were evident in the grass plots.

Pasture Maintenance and Development:

Eighty-five acres of Carib grass and 10 acres of forage sorghum were planted at Central Farm during 1974. The forage sorghum was fed to cattle as a green chop during the main dry season. Fertilization of pastures continued during the year. Some pastures were brush-out and some were treated with 2,4-D to control the growth of weeds.

Two hundred and forty acres of Carib grass was established at the Richmond Hill livestock station in the Orange Walk district. The total area established to pasture on this new station is 500 acres consisting of 460 acres of Carib grass and 40 acres of Guinea grass.

Agricultural Extension:

(1) Extension Activities:

Extension activities included the demonstration of improved cultural practices, distribution of seeds, processing and supervision of loans and assistance to farmers in obtaining mechanical services. The Ministry of Agriculture's Extension Service was organised on a district basis with individual extension officers in charge of a zone within a district. Extension tools utilised included individual contacts with farmers, group discussions, Extension Committee meetings, method and result demonstrations, radio broadcasts, distribution of pamphlets, field tours, etc. In addition, the Extension Service organised in-service training courses for junior extension personnel and courses for selected groups of farmers on various topics of interest to them.

The following is a summary of extension methods used in 1974:

Farm Visits	3,700
Discussion Meetings	175
Method and Results:	
Demonstrations	125
Radio Broadcasts	60
Field Tours	20
Film Shows	10

(2) Mechanical Services:

The Mechanical Division of the Ministry of Agriculture offered mechanical services to farmers, in addition to providing these services for the various schemes run by the Department itself. There is a dearth of these services in the private sector and the Division's machinery was unable to cope with the demand. Nevertheless, during the year under review, the following services were rendered:

Land clearing	1,017 acres
Re-me Ploughing	862 "
Bush-hogging	3,790 "
Ploughing	2,726 "
Harrowing	2,887 "
Planting	1,190 "
Cultivating	427 "
Fertilizing	862 "
Harvesting	206 "

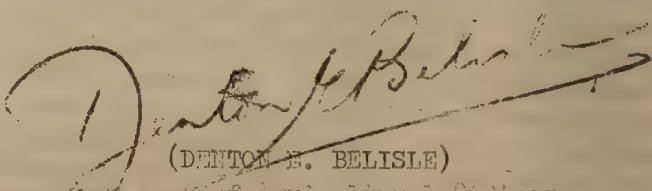
The above figures do not include the harvesting of rice in the Toledo district where 238 combine loads were harvested. The Land Clearing Unit also dug 50 ponds to supply water to farms and was engaged in road-building work. The Well Rig Unit dug a total of 6 good wells in 1974. A further 13 wells were abandoned for various reasons such as lack of ground water, caving in of wells, and other technical problems.

(3) National Agricultural Show:

A very successful National Agricultural Show was held at the Showgrounds in Belmopan on April 20th and 21st. Farmers from all districts participated with a wide variety of crops and livestock exhibits. The Department of Agriculture also exhibited crops and stock. Prizes were awarded to the best exhibits in the respective classes. Agriculture Week was declared open by the Minister of Agriculture one week before the date of the show. Various activities and radio broadcasts were scheduled and the Week culminated with the Show itself.

ACKNOWLEDGEMENTS

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(DENTON E. BELISLE)
Minister of Agriculture

APPENDIX TABLE I

MONTHLY RAINFALL AT VARIOUS STATIONS, 1974 (inches)

STATION / MONTH	LANDIVAR	BELIZE INT'L AIRPORT	HUMMING- BIRD SIBUN	COOMI CAIRN	AUGUSTINE	STANN CREEK AGSTAT	MELINDA FOREST STATION	TOLEDO AGSTAT
January	7.04	10.08	7.20	2.86	1.98	8.37	14.31	11.80
February	0.13	0.22	2.89	2.97	2.97	3.19	3.57	4.47
March	0.64	0.78	1.24	0.09	1.65	0.48	0.42	4.17
April	0.90	1.73	2.84	1.74	2.34	2.04	1.84	4.87
May	8.48	3.57	3.25	1.44	4.06	5.65	4.08	12.78
June	9.89	10.89	12.43	6.32	5.33	5.22	5.10	16.03
July	4.53	4.55	9.58	4.10	6.84	7.92	7.03	18.22
August	3.98	5.15	7.46	4.71	5.59	8.64	8.03	23.60
September	7.63	9.93	14.73	14.90	8.84	10.81	15.97	19.01
October	8.97	17.45	17.65	12.50	12.72	21.71	25.05	8.8
November	4.24	3.81	8.81	5.34	4.33	2.84	6.36	6.47
December	7.22	7.59	8.46	6.97	3.37	6.96	10.47	5.79
ANNUAL TOTAL	63.65	75.75	96.54	63.94	60.02	79.83	100.23	136.02

APPENDIX TABLE II

MEAN MONTHLY MAXIMUM TEMPERATURES AT VARIOUS STATIONS, 1974

(degrees Fahrenheit)

STATION / MONTH	LANDIVAR	COOMA CAIRN	CABBAGE HAUL	AUGUSTINE	STANN CREEK AGSTAT	MELINDA FOREST STATION	SAVANNAH FOREST STATION
January	84	72	82	82	86	85	85
February	83	75	85	83	N.A.	85	83
March	86	79	85	87	88	84	88
April	87	80	86	88	91	87	90
May	88	85	88	91	89	90	91
June	88	82	85	88	89	88	89
July	87	82	83	86	89	90	87
August	89	78	85	85	90	90	88
September	87	80	87	86	89	88	89
October	83	73	81	81	87	84	84
November	82	71	80	80	86	85	83
December	82	71	80	83	84	81	82

APPENDIX TABLE III

MEAN MONTHLY MINIMUM TEMPERATURES AT VARIOUS STATIONS 1974

(degrees Fahrenheit)

STATION / MONTH	LANDIVAR STATION	COOMLA CAIRN	CABBAGE HAUL	AUGUSTINE JULIA	STANN CREAK AGSTAT	MELINDA FOREST STATION	SAVANNAH FOREST STATION
January	74	61	72	62	74	73	71
February	71	59	70	59	N.A.	70	68
March	74	63	74	62	73	74	72
April	77	64	76	65	75	77	74
May	78	67	78	70	79	78	75
June	77	67	77	70	78	78	76
July	77	67	76	67	78	78	76
August	73	66	78	66	77	79	75
September	77	66	78	68	74	77	73
October	72	63	72	67	75	74	72
November	71	61	72	63	72	76	69
December	71	60	71	62	72	71	69

APPENDIX TABLE IV

AVERAGE MONTHLY HUMIDITY AT VARIOUS STATIONS, 1974

(per cent)

STATION / MONTH	BELIZE INT'L AIRPORT	COOMA CAIRN	CABBAGE HAUL	AUGUSTINE	STANN CREEK AGSTAT	MELINDA FOREST STATION	SAVANNAH FOREST STATION
January	84	87	93	77	86	84	77
February	80	79	92	69	N.A.	77	75
March	78	72	93	66	73	82	68
April	72	76	91	63	72	83	64
May	75	72	92	67	80	85	71
June	77	77	94	70	78	87	76
July	80	79	94	73	72	87	78
August	80	80	93	76	76	84	79
September	83	80	93	77	71	83	70
October	85	90	93	84	81	87	76
November	82	92	94	84	75	89	75
December	86	86	93	76	79	85	79

APPENDIX TABLE V

SLAUGHTER RETURNS, 1974

A R E A	CATTLE			PIGS		
	No.	Dressed Weight (lb)	Ave. Dressed Weight (lb)	No.	Dressed Weight (lb)	Ave. Dressed Weight (lb)
Corozal Town	424	137,112	323.4	102	5,932	58.2
Orange Walk Town	454	153,071	337.2	483	39,644	82.1
Belize Municipal	2,936	944,523	321.7	3,613	229,752	63.6
Belize Meat Packers	757	294,481	389.0	105	17,358	165.3
San Ignacio Town	857	307,070	358.3	887	85,840	96.8
Benque Viejo Town	29	8,926	307.8	13	11,110	85.4
Stann Creek Town	170	48,726	286.6	357	22,056	61.8
Punta Gorda Town	43	13,980	325.1	365	24,679	67.6
T O T A L S	5,670	1,907,889	336.5	5,925	426,371	72.0

APPENDIX TABLE VI

CLINICAL CASES

Horse Cattle Sheep Pig Dogs Cat Poultry Other

A. Specific Disease

Vesicular Disease	Three negative cases investigated						
	None	seen					
Rabies							
Distemper						101	
Leptospirosis						27	
Tetanus	2		4	2	1		
Blackleg		28					
Colibacillosis	1	1					3
Fowl Typhoid							4
Fowl Choryza							344 (in 4 Outbreaks)
Fowl Cholera							12
Coccidiosis		3			2		421 (in 8 Outbreaks)
Ring worm				2	1		
Anaplasmosis		17					
Salmonellosis in							
4 Guinea Pigs							
Botulism in 2 Ducks							

B. Diseases of the Alimentary Tract

Non-Specific Enteritis	4	22	5	16	12		12	2 (Goat)
Colic	7	1	1	1				1 Monk
Gastritis					1			
Ruminal Atony		1						
Indigestion				1				
Bloat		1						
Constipation	1	2		1				
Lampas	3							
Hepatitis					1			

C. Diseases of Urogenital Tract

Metritis		11		7	2			1 (Goat)
Retained Placenta	1	30	2					1 (Goat)
Mastitis		22		3				
Crushed Young				5				
Abortion		10	3		2			
Still Birth		1	2					
Dystocia	1	6		1	4			
Vaginal Prolapse		1						
Pyometra					1			
Agalactia				4				
Hypoglycaemia				13				
Obturator Paralysis		1						
Deformity at Birth				1				
Scrotal Hernia				1				
Paraphimosis	1							
Venereal Granuloma					4			
Urinary Retention	1				1			

Horse Cattle Sheep Pig Dogs Cat Poultry Other

Diseases of The
Skin and
Appendages

Eye Infection	5	2		2	14	1	2
Ear Infection		4		3	22	2	
Trauma	23	28		2	24		
Allergy					14		
Navel Infection	4			4	1		
Navel Hernia				2	1		
Foot Rot/Foul's foot	3	2	4	1			
Abscess	1	12		6			
Sand Crack				1			
Keratitis	1				3		
Warts	1	12					
Sting				1			

Diseases of
Respiratory System

Pneumonia		12	1	4	2		
Respiratory							
Infection	4	2	8	5	5	1	16
Rhinitis	5	5	1	9	2		
Vermineous							
Bronchitis		1	1				
Cough			1	2			

Diseases of Locomotor
System

Joint I	2	2		4	1		
Tendonitis	4	6		1	1		
Rheumatism					2		
Laminitis	10	1					
Axial Paralysis		2					

Diseases of Parasitic
Origin

Ectoparasites	101	418		53	97	1	36	
Endoparasites	131	507	104	367	397	34	1106	26 (goat)
Lungworm		6		1				
Myiasis	1	23		6	11			
Beefworm				1				
Heartworm					1			
Mange	1			2	4	1		
Habronemiasis	2							

Miscellaneous
Diseases

Fever	5	5	4	11	5			
Local Infection		2						
Glandular Swelling		1						
Anaemia	1	1		6				

	<u>Horse</u>	<u>Cattle</u>	<u>Sheep</u>	<u>Pig</u>	<u>Dog</u>	<u>Cat</u>	<u>Poultry</u>	<u>Other</u>
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H. Miscellaneous Diseases

Malnutrition	1	48			1			
Poisoning	1	10	2		5			
Vitamin A Deficiency							3000	1 (lion)
Tumor					4			
Other Cases	23	38	14	34	166	6	14	

I. Vaccinations

Rabies	1				84	2		
Blackleg	81	4531	40					4 (goats)
Warts		1						
Distemper					106			
Leptospirosis					94			

J. Other Techniques

Castration	27	35	20	79	21	2		
Pregnancy Tests	1	389						
Tail Docking			12					
Brucella Blood Test		50						
Euthanasia					1			
Surgery					11			

TOTAL NO. OF CASES:

Horse	-	462
Cattle	-	6314
Sheep	-	229
Pig	-	665
Dog	-	1260
Cat	-	50
Poultry	-	4970
Other	-	40

TOTAL

 13,990

APPENDIX TABLE VII Continued

	<u>Cattle</u>	<u>Pigs</u>	<u>Sheep</u>	<u>Others</u>
<u>Other Parts Condemned</u>				
Tuberculosis		19 heads		
Abscess of S'max LN.		49 heads		
Pericarditis	3 hearts			
Enteritis (localised)	9 intestines	5 intestines		
Melanosis	3	319 (trimmings)		
Necrosis	17	9 (other organs)		
Bruising (Severe)	192	123 (portions of carcase)		
Benign Tumours	39	69 (trimmings)		
Abscess of LN.	1 udder			
Petechiae	12	14 (unspecified organs)		
<u>Parasitic Conditions Seen</u>				
Ascaris Lumbricoides		78		
Oesophago stomum spp.	115	1	4	
Stephanuris dentatus		3424		
Cysticercosis		20		
Liver Fluke		10	2	1 goat
Other worms	5	29		
Lung worm	100	2011		
Mange	4	35		
<u>Summary of Condemnations</u>				
Carcases	106	75		
Lungs	1891	4395		1 goat
Liver	662	2371	1	
Kidneys	293	3644		
Hearts	3			
Heads		68		
Portions of Carcase	192	123		
Trimmings	42	398		
Other (or Unspecified) organs	39	28		

APPENDIX TABLE VII

DISEASES SEEN AT MEAT INSPECTION

	<u>Cattle</u>	<u>Pigs</u>	<u>Sheep</u>	<u>Others</u>
<u>Carcases Condemned</u>				
Tuberculosis	2			
Actinomycosis		1		
Septicaemia	12	13		
Malignant Tumor		5		
Metritis (Acute, Septic)	8	3		
Imperfect Bleeding	66	12		
Oedema and Poor Condition	15	12		
Fever	2			
Icterus	1	9		
Cysticercosis		20		
	<u>106</u>	<u>75</u>		
<u>Lungs Condemned</u>				
Oedema	14			
Contamination	41	116		
Pneumonia	73	135		
Lung worm	100	2011 (also see "parasitic conditions")		
Necrosis	898	1098		1 goat
Emphysema	50	6		
Congestion	715	1029		
	<u>1891</u>	<u>4395</u>		<u>1</u>
<u>Kidneys Condemned</u>				
Hydronephrosis	290	220		
Stephanuris dentatus		3424 (also see "parasitic conditions")		
Nephritis	3			
	<u>293</u>	<u>3544</u>		
<u>Livers Condemned</u>				
Cirrhosis	261	1829		
Telangiectasis	272	99	1	
Abscesses, Cloudy Swelling	84	365		
Necrosis	45	47		
Cystic		31		
	<u>662</u>	<u>2371</u>	<u>1</u>	

APPENDIX TABLE VIII

COMPARISON OF AVERAGE BIRTH WEIGHTS OF DIFFERENT CATTLE BREEDS

FOR - 1971 - 1972 - 1973 & 1974.

Breed	Number of Calves				Average Birth Weight			
	1971	1972	1973	1974	1971	1972	1973	1974
Costa Rican (Females)	52	79	138	148	56.00	57.20	56.00	56.29
Costa Rican (Male)	71	100	132	149	56.30	58.83	60.10	60.78
Red Poll (Female)	21	24	14	9	64.30	63.10	65.06	64.22
(Male)	24	19	26	9	68.50	68.40	72.01	79.33
Pure Brahman (Female)	11	15	19	14	65.00	57.60	57.08	55.00
(Male)	14	16	16	16	66.40	57.90	59.02	61.56
Brown Swiss (Female)	6	12	7	5	70.30	57.70	73.01	87.80
(Male)	11	14	7	5	81.40	75.40	83.08	81.20
Hereford (Female)	-	5	3	17	-	52.00	52.03	52.41
(Male)	-	5	2	18	-	47.80	55.00	52.66

APPENDIX TABLE IXCOMPARISON OF AVERAGE BIRTH WEIGHTS OF DIFFERENT CATTLE BREEDSFor: 1972 - 1973 & 1974COSTA RICAN BRAHMAN CROSSES

Breeds X Brahman	Number of Calves			Average Birth Weights		
	1972	1973	1974	1972	1973	1974
Costa Rican X Brahman (Female)	79	80	91	57.30	53.01	54.10
(Male)	100	76	84	59.00	56.02	58.14
C.R. X Red Poll (Female)	7	20	26	56.71	54.05	55.88
(Male)	7	16	22	60.85	58.01	59.59
C.R. X Angus (Female)	3	10	2	55.33	56.02	57.00
(Male)	9	6	2	57.44	50.06	55.00
C.R. X Charolais (Female)	9	16	21	61.50	57.02	65.23
(Male)	9	23	34	60.30	62.00	70.11
C.R. X Indú Brazil (Female)	2	4	3	51.50	65.00	54.66
(Male)	1	9	4	76.00	67.00	56.50
C.R. X Brown Swiss (Female)	5	8	5	66.20	53.00	61.20
(Male)	1	9	3	58.60	58.00	47.33
C.R. X All Breeds (Female)	105	138	148	57.87	56.00	56.29
(Male)	131	132	149	59.19	60.16	60.78

APPENDIX TABLE X

COMPARISON OF AVERAGE BIRTH WEIGHTS OF DIFFERENT CATTLE BREEDS

For: 1973 and 1974

Artificial Insemination

A.I. Different Crosses	Number of Calves		Average Birth Weights	
	1973	1974	1973	1974
Brown Swiss X Brown Swiss				
(Female)	3	2	82.03	80.00
(Male)	-	5	-	83.00
C.R. Brah. X Hereford				
(Female)	5	6	74.04	62.16
(Male)	1	6	57.00	45.16
C.R. Brah. X Charolais				
(Female)	2	6	71.00	63.50
(Male)	3	7	89.03	50.00
C.R. Brah. X Red Poll				
(Female)	1	11	53.00	59.45
(Male)	5	-	73.00	60.00
C.R. Brah. X Angus				
(Female)	5	7	68.06	52.00
(Male)	1	8	76.00	54.12
C.R. Brah. X Brahman				
(Female)	-	-	-	-
(Male)	1	1	56.00	64.00
C.R. Brah. X Limousin				
(Female)	1	-	72.00	-
(Male)	-	-	-	-
C.R. Brah. X Simmental				
(Female)	2	-	60.00	-
(Male)	-	2	-	56.50
Red Poll X Red Poll				
(Female)	-	12	-	59.50
(Male)	-	9	-	66.33

APPENDIX TABLE XI

COMPARISON OF AVERAGE WEANING WEIGHTS OF DIFFERENT CATTLE BREEDS

1971 - 1972 - 1973 - 1974

Breed	Number of Calves				Average Weaning Weights (lb.)			
	1971	1972	1973	1974	1971	1972	1973	1974
C.R. Brahman								
(Female)	15	103	124	180	386.60	333.90	344.00	363.60
(Male)	43	83	141	174	453.50	364.70	359.80	393.12
Pure Red Poll								
(Female)	8	30	17	17	432.90	373.20	383.00	357.17
(Male)	16	20	15	16	454.20	425.90	410.20	329.00
Pure Brahman								
(Female)	3	16	15	15	410.00	365.80	362.60	363.26
(Male)	8	15	20	13	423.60	397.70	397.50	428.92
Pure Brown Swiss								
(Female)	1	10	6	5	310.00	285.30	340.50	371.30
(Male)	4	9	5	6	378.50	347.20	334.40	406.83
Pure Hereford								
(Female)	-	-	7	3	-	-	189.80	150.00
(Male)	-	2	1	5	-	326.00	300.00	170.40

Average for all Female for 1974 on 220 head = 360.35

Average for all Male for 1974 on 214 head = 385.68

Average for all Male & Female 1974 on 434 head = 379.06

APPENDIX TABLE XII

COMPARISON OF AVERAGE WEANING WEIGHTS FOR DIFFERENT CATTLE BREEDS

1972 - 1973 - 1974

Breed	Number of Calves			Average Weaning Weights		
	1972	1973	1974	1972	1973	1974
C.R. X Brahman	-	-	-	-	-	-
(Female)	103	83	72	333.90	316.60	345.40
(Male)	83	100	61	364.70	344.90	365.77
C.R. X Red Poll	-	-	-	-	-	-
(Female)	6	12	34	353.60	384.80	353.17
(Male)	1	8	36	333.00	400.80	392.88
C.R. X Charolais	-	-	-	-	-	-
(Female)	5	18	28	376.80	406.70	414.50
(Male)	4	18	38	419.00	456.00	450.57
C.R. X Angus	-	-	-	-	-	-
(Female)	2	4	13	345.00	339.90	361.76
(Male)	5	6	8	336.50	353.70	361.00
C.R. X Hereford	-	-	-	-	-	-
(Female)	-	3	17	-	383.00	366.17
(Male)	-	3	13	-	370.60	374.61
C.R. X Brown Swiss	-	-	-	-	-	-
(Female)	-	4	7	-	378.00	403.71
(Male)	2	6	6	264.00	279.10	380.16
C.R. X Indú Brazil	-	-	-	-	-	-
(Female)	-	-	9	-	-	356.88
(Male)	2	-	12	286.00	-	398.91
Av. Weaning Weight	-	-	-	-	-	-
C.R. X All Crosses	-	-	-	-	-	-
(Female)	116	124	180	336.09	344.00	363.60
(Male)	97	141	174	356.09	359.80	393.12

Range (Females) 112 - 577 lb.

Range (Males) 140 - 680 lb.

Weaning Age (8 months)

+ Lowest weaning weights Female and Male - C.R. X Hereford

++ Highest weaning weights Female and Male - C.R. X. Brah.

APPENDIX TABLE XII

RESULTS OF CATTLE BREEDING PROGRAMMES

1971 - 1972 - 1973 & 1974

Breed	No COWS EXPOSED					No COWS NOT PREGNANT					No OF COWS WITHOUT A CHANCE OF GETTING PREGNANT					% CONCEPTION			
	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974			
Pure Brahman	42	40	36	38	11	20	10	7	6	12	6	17	74%	50%	72%	82%			
Costa Rican #2	196	219	181	186	70	99	40	55	65	59	17	30	64%	55%	78%	71%			
Costa Rican A.1.	-	-	169	175	-	-	61	48	-	-	18	24	-	-	64%	73%			
Costa Rican #1	77	74	91	90	6	27	19	14	3	17	20	18	93%	64%	79%	85%			
Charbrais Terd	7	37	53	55	3	10	15	9	-	7	4	5	58%	73%	72%	84%			
Hereford & C.R.	13	36	53	48	7	20	20	18	3	12	3	7	47%	45%	63%	63%			
Brown Swiss	-	-	18	26	-	-	4	10	-	-	6	7	-	-	73%	62%			
Red Poll	55	50	51	50	9	23	8	15	7	12	13	10	84%	54%	85%	70%			

No Charge = Cows that are open but with small calves

Ranges: 1971 = 47% to 93% Average = 71%
 1972 = 45% to 73% Average = 66%
 1973 = 63% to 85% Average = 74%
 1974 = 62% to 85% Average = 74%

APPENDIX TABLE XIVAVERAGE DAILY GAINPURE BRAHMAN - FEMALES

Brand	Date of Birth	Birth Weight	Date last Weight	Last Weight	Age Days	Lb. Gain	Av. Daily Gain
1-292	5/11/71	64 lb.	15/1/74	841 lb.	801	777	.97
3-81	21/2/73	53 lb.	15/1/74	330 lb.	328	277	.84
3-91	25/2/73	56 lb.	15/2/74	250 lb.	355	194	.54
3-128	13/3/73	55 lb.	17/4/74	390 lb.	400	335	.83
3-142	16/3/73	54 lb.	17/4/74	330 lb.	397	276	.69
3-291	25/10/73	60 lb.	30/10/74	307 lb.	370	247	.66
3-300	27/10/73	60 lb.	23/8/74	367 lb.	300	307	1.02
3-311	31/10/73	64 lb.	23/8/74	357 lb.	296	293	.98
3-344	12/11/73	56 lb.	21/12/74	465 lb.	405	409	1.00
3-357	16/11/73	57 lb.	21/12/74	475 lb.	400	418	1.04
3-404	9/12/73	77 lb.	21/12/74	455 lb.	377	378	1.00
4-114	21/2/74	59 lb.	21/12/74	415 lb.	303	356	1.17
4-124	24/2/74	53 lb.	21/12/74	400 lb.	300	347	1.15
4-199	26/3/74	58 lb.	21/12/74	386 lb.	270	328	1.21

Total Average Daily Gain = .93

Range = .54 to 1.21 lb.

AVERAGE DAILY GAINPURE BRAHMAN - MALES

2-337	18/10/72	55 lb.	15/1/74	469 lb.	454	414	0.91
2-29	2/2/73	57 lb.	15/1/74	372 lb.	347	315	0.90
3-78	21/2/73	52 lb.	21/12/74	823 lb.	668	771	1.15
3-90	25/2/73	59 lb.	21/12/74	820 lb.	664	761	1.14
3-99	1/3/73	55 lb.	18/6/74	400 lb.	474	345	0.72
3-139	12/3/73	53 lb.	17/4/74	353 lb.	401	300	0.74
3-136	15/3/73	60 lb.	28/8/74	553 lb.	531	493	0.92
3-191	7/4/73	51 lb.	15/1/74	465 lb.	283	414	1.46
3-321	5/11/73	71 lb.	21/12/74	616 lb.	411	545	1.32
4-117	22/2/74	61 lb.	21/12/74	400 lb.	302	339	1.12
4-153	8/3/74	61 lb.	21/12/74	356 lb.	288	295	1.02
4-227	9/4/74	62 lb.	21/12/74	337 lb.	256	275	1.07

Total Average Daily Gain = 1.03 lb.

Range = 0.72 to 1.46 lb.

APPENDIX TABLE XV.

BREAKDOWN OF AVERAGE DAILY GAINS - 1974

Breed	No. of Animals	Sex	Total Av. Daily Gain	Range
Pure Brahman	14	Female	0.93 lb.	0.54-1.21 lb.
	12	Male	1.03 lb.	0.72-1.46 lb.
Red Poll	15	Female	0.87 lb.	0.48-1.19 lb.
	11	Male	0.92 lb.	0.67-1.25 lb.
Brown Swiss	11	Female	0.72 lb.	0.54-0.92 lb.
	12	Male	0.98 lb.	0.58-1.28 lb.
Hereford	6	Female	0.49 lb.	0.29-0.71 lb.
	1	Male	0.43 lb.	0.43 lb.
<u>CROSSES</u>				
Red Poll X Brah.	9	Female	1.04 lb.	0.88-1.37 lb.
	8	Male	1.15 lb.	1.01-1.31 lb.
Angus X Brah.	6	Female	1.09 lb.	0.92-1.34 lb.
	2	Male	0.93 lb.	0.86-1.00 lb.
Hereford X Brah.	4	Female	1.01 lb.	0.93-1.13 lb.
	3	Male	1.01 lb.	0.76-1.15 lb.
Indu Brazil X Brahman	3	Female	0.93 lb.	0.90-0.97 lb.
	3	Male	1.11 lb.	0.97-1.20 lb.
Charolais X Brah.	29	Female	1.07 lb.	0.79-1.56 lb.
	26	Male	1.27 lb.	0.64-1.83 lb.
Brown Swiss X Brahman	5	Female	0.94 lb.	0.88-1.04 lb.
	3	Male	1.06 lb.	0.75-1.27 lb.
C.R. Brahman X Brahman	50	Female	0.96 lb.	0.35-1.41 lb.
	46	Male	1.00 lb.	0.51-1.38 lb.

APPENDIX TABLE XVI.

Breed	No of Litters	Average No of Pigs Born per litter	Average No of Pigs Weaned per litter	Total lb. of Meat Weaned	Average Weaning Weight per litter
Large White	3	11	9.66	250 lb.	27.8 lb.
Landrace	1	13	(All piglets died 4 days after parturition from malnutrition)		
Duroc	3	10	6	175.8	29.3
Different Crosses	5	7	6.75	248.4	36.8

